

THE CLAIMS ARE:

1. A microwave heating system using a heat conductive medium comprising:

a heater including :

a shell forming an enclosure having an upper end and a lower end,

5 a heating coil located in the enclosure, the heater coil having an upper end and a lower end and having an inverted frusto-conical shape, the upper end of the coil being larger than the lower end,

three magnetrons mounted adjacent the heating coil, one magnetron being located at the upper end of the heating coil and the other two
10 magnetrons being located on opposite sides of the heating coil for directing microwave energy into the heating coil,

an electrical distribution system connected to the magnetron;

a return line for supplying the heat conductive medium into the heater coil adjacent the lower end of the shell;

15 a line means connected to the heating coil toward the upper end of the enclosure and extending outside the shell;

heat exchanger means connected to the line means to receive heat conductive medium and connected to the return line; and

a circulator located in the return line.

20 2. A heating system according to claim 1 wherein the heater further includes a leak detector for detecting the presence of heat conducting medium, the leak detector being located at the lower end of the shell.

3. A heating system according to claim 1 wherein the heater further includes a

drip pan located at the lower end of the shell.

4. A heating system according to claim 1 wherein the heater further includes insulation within the enclosure about the heating coil and the magnetrons.

5 5. A heating system according to claim 1 further including a microwave leak detector located in the shell above the upper end of the heating coil for detecting the presence of microwave energy outside of the heating coil.

6. A heating system according to claim 1 further including an air intake fan located toward the upper end of the shell for blowing air into the enclosure and an air exhaust port also located toward the upper end of the shell.

10 7. A microwave heating system using a heat conductive medium comprising:
a heater including:

a shell forming an enclosure and having an upper end and a lower end,

a heating coil located inside the shell,

15 at least one magnetron for directing microwave energy into the heating coil,

an electrical distribution system connected to the magnetron,

a return line for supplying the heat conductive medium into the heating coil adjacent the lower end of the shell;

20 a feed line connected to the heating coil toward the upper end of the shell and extending outside the shell;

a supply line; and

means for connecting the feed line to the supply line, the supply line

having two branches, one branch being connected to the return line;

a domestic hot water heater including:

a first heat exchanger having two ends,

at least one medium tube located inside the first heat exchanger,

5 the other branch of the supply line being connected to the medium tube at one end of the first heat exchanger, the return line being connected to the medium tube at the other end of the first heat exchanger,

at least one water tube located in the first heat exchanger,

a plurality of fins extending across both the medium tube and the
10 water tube to conduct heat from the medium tube to the water tube,

a second heat exchanger having two ends,

a water coil located in the second heat exchanger, having two
ends, the water tube being connected to the water coil at both ends; and

heater lines connected to the return line to convey heat conductive
15 medium for heating purposes from the return line and back to the return line; and

at least one circulator located in the return line;

8. A heating system according to claim 7 wherein the heater further includes a
leak detector for detecting the presence of heat conducting medium, the leak detector
being located at the lower end of the shell.

20 9. A heating system according to claim 7 wherein the heater further includes a
drip pan located at the lower end of the shell.

10. A heating system according to claim 7 wherein the heater further includes
insulation within the enclosure about the heating coil and the magnetron.

11. A heating system according to claim 7 further including a microwave leak detector located in the shell above the heating coil for detecting the presence of microwave energy outside of the heating coil.

12. A heating system according to claim 7 further including an air intake fan located toward the upper end of the shell for blowing air into the enclosure to cool the magnetrons and an air exhaust port also located toward the upper end of the shell.

13. A microwave heating system according to claim 7 wherein the heating coil has an upper end and a lower end and wherein the heating coil has an inverted frusto-conical shape, the upper end of the heating coil being larger than the lower end.

14. A microwave heater system using a heat conductive medium comprising:
a heater including:

a shell forming an enclosure and having an upper end and a lower end,

a heating coil located toward the lower end of the enclosure, the heating coil having the shape of an inverted frustum,

three magnetrons for directing microwave energy into the heating coil, one magnetron being located at the top of the heating coil and two other magnetrons being located at opposite sides of the heating coil;

a pressure relief valve extending from the heating coil through the shell,

an electrical distribution system connected to the three magnetrons,

a cooling fan for blowing air from outside the shell into the

lines.

15. A microwave heating system according to claim 14 wherein the domestic hot water heater further includes:

a first heat exchanger having an upper end and a lower end;

5 at least one medium tube located inside the first heat exchanger;

the other branch of the supply line being connected to the domestic hot water heater at the medium tube in the lower end of the first heat exchanger, the domestic hot water heater being connected to the return line at the medium tube at the upper end of the first heat exchanger;

10 a water tube located in the first heat exchanger;

a plurality of fins extending along both the medium tube and the water tube to conduct heat from the medium tube to the water tube;

a second heat exchanger having an upper end and a lower end and having an inside, a water inlet and a water outlet located at the upper end of the second heat exchanger; and

15 a water coil located in the second heat exchanger, the water coil in the second heat exchanger having an upper end and a lower end, the water tube being connected to the coil at both its upper end and its lower end.

16. A microwave heating system according to claim 14 further including:

20 a medium tank including a pressure gauge and a pressure filler valve;

a filler line connecting the medium storage tank to the return line; and

a volume sensor switch and a gate valve located in the filler line.